



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

*Handwritten:* JMW  
AFC

Applicant(s): ELEFThERIOU, Andreas et al.  
Agent Docket No.: 2993-486US SC/sm  
Serial No.: 10/628,556  
Filed: July 29, 2003  
Confirmation No.: 1804  
Title: TURBOFAN CASE AND METHOD OF MAKING  
Examiner: KIM, Tae Jun  
Art Unit: 3746

**REVISED APPEAL BRIEF**

In response to the Notification of Non-Compliant Appeal Brief dated November 27, 2006, Applicant hereby resubmits, in triplicate, the Appeal Brief filed on July 13, 2006. The Brief has been corrected as required in the aforementioned Notification.

The Commissioner is hereby authorized to any fee which may be required to **Deposit Account No. 19-5113**.


Respectfully submitted,

Andreas ELEFThERIOU et al.

By:

December 21, 2006

Date

  
Sébastien CLARK, Registration No. 56,651  
Agent of Record  
OGILVY RENAULT LLP  
1981 McGill College Ave.  
Montreal, Quebec, Canada H3A 2Y3  
Tel: (514) 847-4259  
Fax: (514) 288-8389

Commissioner for Patents

Docket No.: 2993-486US/SC



Serial No. 10/628,556

Montreal, CANADA

December 21, 2006

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: ELEFThERIOU, Andreas et al.

Application No.: 10/628,556

Confirmation No. 1804

Filed: July 29, 2003

Title: Turbofan Case and Method of Making

Examiner: KIM, Tae Jun

Group Art Unit: 3746

---

**MAIL STOP APPEAL BRIEF - PATENTS**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
U.S.A.

**REVISED APPEAL BRIEF**

Sir:

This is an Appeal from the Examiner in Group Art Unit 3746 finally rejecting Claims 1 to 15 in the above-identified Patent Application. The Appeal Brief is being filed within one month from the mailing of the Pre-Appeal Brief decision.

1. REAL PARTY IN INTEREST

The real party of interest in this Appeal is the Assignee, Pratt & Whitney Canada Corp.

2. RELATED APPEALS AND INTERFERENCES

None.

3. STATUS OF CLAIMS

Claims 1 to 15 are pending in this application. A copy of the pending claims pursuant to the Amendment of October 5, 2006 can be found in Appendix A.

As per the Final Action dated December 12, 2005, Claims 1 to 15 stand rejected.

Claims 1 to 15 are being appealed.

4. STATUS OF AMENDMENTS

Applicant's last amendment filed on October 5, 2006 has been entered. No amendment has been filed in response to the Final action of December 12, 2005.

5. SUMMARY OF CLAIMED SUBJECT MATTER

The application contains three independent claims, namely claims 1, 7 and 12. The remaining claims 2-6, 8-11 and 13-15 depend directly or indirectly upon independent claims 1, 7 and 12. Independent claims 1, 7 and 12 and the claims depending thereon may be grouped broadly as being directed to an integrated or single-piece turbofan case.

Independent claim 1 of the present application relates generally to a casing for a turbofan engine having a fan case portion, an intermediate case portion and a gas generator case portion wherein, as claimed in claim 1, the fan case portion, the intermediate case portion and the gas generator case portion are integrally joined together, thereby forming an integral casing, as for instance shown in Figs. 3, 4 and 6 and described in paragraphs 0031 and 0034 of the application (see casing 32, fan case portion 44, intermediate case portion 46 and gas generator case portion 52).

Independent Claim 7 is directed to a bypass turbofan engine 10 having a one-piece casing, such as casing 32 shown in Figures 3, 4 and 6, and as described in paragraphs [0031] and [0034] of the application. The one-piece casing 32 substantially encases a fan 13, a compressor 16 and a gas generator section 18, 20 of the engine as shown in Figure 3. The advantages associated with the use of such a one-piece casing are presented at paragraphs [0036] to [0039].

Independent claim 12 of the present application also relates to a

turbofan engine having a rotating assembly including a fan portion 13, a compressor portion 16 and a gas generator portion 18, 20; and a generally tubular casing 32 substantially enveloping the rotating assembly, the casing being an integrated single piece.

As described in paragraph 0036 to 0039 of the application, the configuration yields unexpected results.

**6. GROUND OF REJECTION TO BE REVIEWED ON APPEAL**

The grounds of rejection to be reviewed on appeal are:

1) The 102(a or e) rejection of claims 1, 2, 12, 13 and 15 as being anticipated by Springer (US 6,532,731).

2) The 103(a) rejection of claims 1, 2, 5, 7, 8, 11, 12, 13 and 15 as being unpatentable over Stuart (US 4,790,133) in view of Davies et al. (US 3,720,060) or Udall et al. (US 5,409,184).

3) The 103(a) rejection of claims 1, 2, 5-7, 11-13 and 15 as being unpatentable over Udall et al. (US 5,409,184) in view of Stuart (US 4,790,133).

4) The 103(a) rejection of claims 3, 4, 9, 10 and 14 as being unpatentable over either Udall et al. (US 5,409,184) in view of Stuart (US 4,790,133) or Stuart (US 4,790,133) in view of Davies et al. (US 3,720,060) or Springer (US 6,532,731), and further in view of Allen (US 6,109,022).

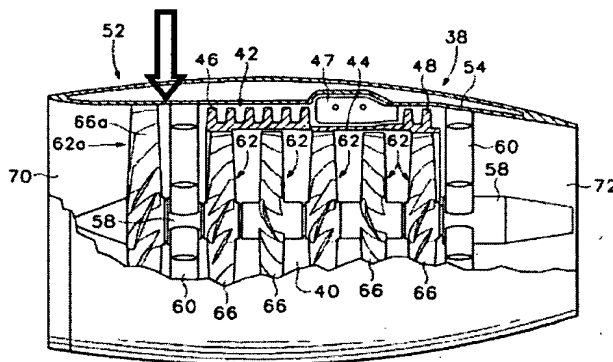
**7. ARGUMENTS**

**102 and 103 rejections based on Springer (US 6,532,731), Stuart (US 4,790,133) and/or Udall et al. (US 5,409,184)**

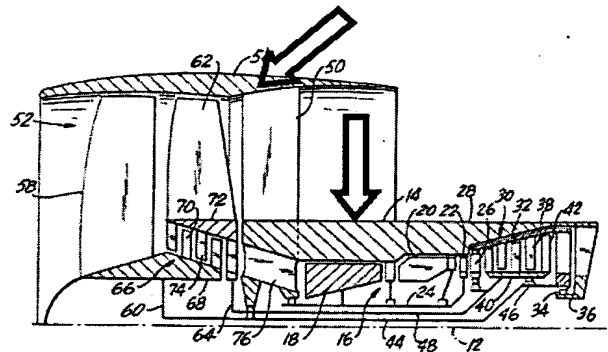
Although the patentability of claims 1-15 is separately argued under the subheadings below, a fundamental basis of the patentability argument is, in each case, the lack of support for the interpretation given by the Examiner to the key cited references. There does not appear to be any disagreement between the Examiner and Applicant with respect to the scope of pending claims 1-15.

The interpretation given to the prior art is not supportable in view of all the surrounding facts, and hence the claim rejections lack proper support.

The cornerstone of all independent claim rejections, whether under 35 USC 102 or 35 USC 103, is an allegation that the schematic figures of the primary references "appear" to disclose the claimed invention. The Applicant contends that the interpretations given to these references are not supported by the references themselves, nor do they align with the interpretation that would be accorded by the skilled reader, as determined from the surrounding evidence. The figures in question show an engine case as an unbroken line/area (large arrows added for clarity):



Springer (US6,532,731)



Stuart (US\$4,790,133)

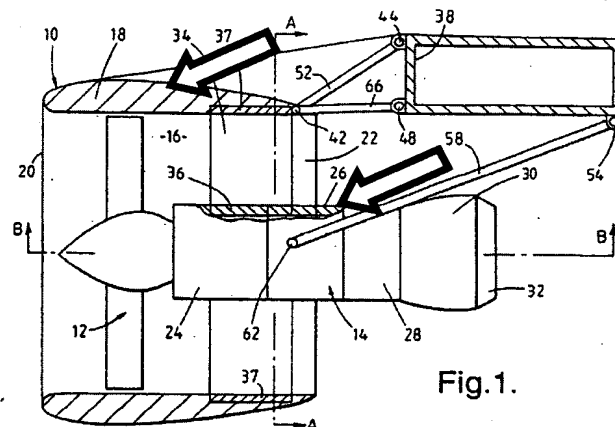


Fig.1.

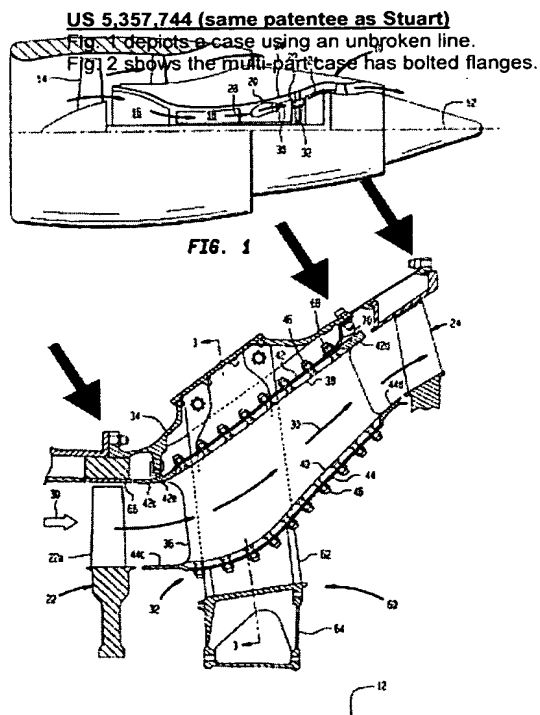
Udall (US 5,409,184)

The Applicant submits that the interpretation given to these references is, in each case, improper because:

1. The schematic figures cited in support of the rejections are, at best, equivocal and there is no textual (or other) teaching in any reference which resolves the

ambiguity in favour of the Examiner's position. It is normal for schematic figures to simplify *irrelevant features* for description purposes – engine case design is *irrelevant* to each of these references. The skilled reader would therefore understand that the turbofan case shown in these references is not fully described, and therefore must be intended to be conventional. In other words, the references cannot be interpreted to advance the state of the art and, if challenged by the Applicant, the interpretation should be substantiated through the citation of additional prior art in support.

2. In the field of turbofan case design, *multi-piece* engine cases are often depicted *schematically* in a manner similar to the figures of Springer, Stuart, and Udall et al. See, for example, US Patent Nos. 5,357,744 (*same patentee as Stuart*) and US 5,899,660 (*same patentee as Udall et al*), shown below, which demonstrate that a skilled reader would not interpret a simplified schematic as teaching a single integrated turbofan case. See, also, the applicant's supplemental Information Disclosure Statement filed on April 12, 2006 for many other examples of this common practice. The skilled reader must be assumed to be knowledgeable of all common practices in the art, including the ways in which the art is commonly described in patents.



**US 5,899,660 (same patentee as Udall et al)**

Fig. 1 depicts a case using an unbroken line.

Fig. 1.

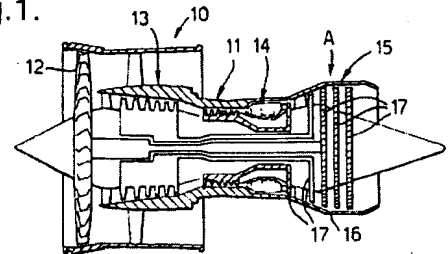
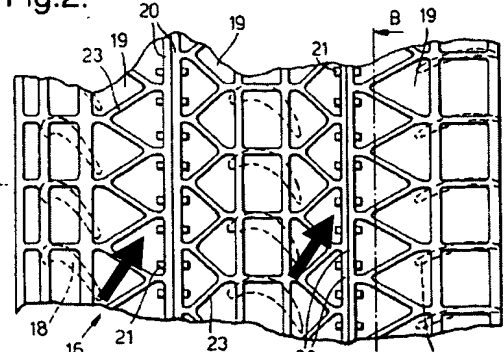


Fig.2.



3. The Courts have stated that: (i) It is improper to "magnify a common drafting practice...into an alleged suggestion of [the claimed invention] through the exercise of hindsight" *In re Klein*, 26 USPQ2d 1133 at 1136 (Fed. Cir. 1993), (Emphasis added) - simplifying features in schematic figures is just such a common drafting practice; and (ii) The drawings are merely helpful in determining whether the prior art included a specific feature within its teachings. *Afros S.p.A. v. Krauss-Maffei Corp.* 5 USPQ2d 1145 (D. Del. 1987), (Emphasis added). The drawings must be interpreted in keeping with the specific teachings of the reference as a whole.
4. It is noted on page 7 of the Final Office Action that the "*applicant presumes that because multi-piece casings are conventionally used in the art, that there are no integral cases. To assume the contrary, one's knowledge of the art would have to be infinite to cover the entire spectrum of the prior art*". Applicant respectfully notes, however, that there are likewise no presumptions which favour the rejection of claims when it comes to demonstrating what exists in the prior art. Other than Springer, Stuart and Udall et al - which Applicant suggests have been incorrectly applied - no prior art teachings support the Examiner's position.
5. It is further noted by the Examiner, on page 7 of the Office Action, that the references relied upon "*do not preclude integral joining*". However, this is not the correct threshold to apply, and perhaps indicates that the rejections rely improperly on hindsight.

**102 (a or e) rejections of claims 1, 2, 12, 13 and 15 based on Springer (US 6,532,731)**

The Examiner alleges that Springer discloses all elements of the impugned claims, however the Examiner has provided no textual basis in Springer supporting this assertion, and therefore the rejection must be assumed to be based on the Figures alone. Since Springer is clearly not directed to the design or construction of

an engine casing at all, Springer's disclosure and teachings must therefore be limited to its figures.

Springer shows, in Figure 1, a "prior art" turbofan in which the case is an unbroken structure, and which is very similar to the way in which the case of Springer's invention is depicted in Figure 2. This would lead the skilled reader to determine there is nothing remarkable about Springer's case relative to the prior art. As noted above, (i) it is common practice to remove irrelevant features from schematic figures (such as details of case design); and (ii) absent specific teachings to the contrary, where there is no special teaching about a feature depicted in a schematic figure, the skilled reader will assume the feature is conventional. The Applicant has provided much evidence to show that conventional turbofan cases are multi-piece bolted assemblies and states that single-piece turbofan cases are heretofore unknown; the Examiner has provided no additional evidence to bolster the interpretation attributed by the Examiner. On balance, the Applicant suggests the evidence favours the Applicant's position.

Furthermore, there are many design "flaws" in Springer's case which would convince the skilled reader that the figures are not intended to disclose any actual case design. For example, the cylindrical sections of inner wall 54 upstream of the combustor would not be sufficiently rigid against buckling to support the engine - it is well known that stiffening features are required in turbofan case designs. Also, close proximity of the inner wall 54 to combustor 47 would result in relative thermal expansion between the various portions of the wall 54, causing buckling if provided as drawn. In both cases, the skilled reader would understand that Springer does not intend to teach anything about case construction, since many simple design principles are ignored (or, more accurately, intentionally omitted because they are irrelevant to the teachings of the document).

Therefore, Applicant submits that Springer would be interpreted by the skilled reader to disclose – if anything – a case bolted in a conventional manner. Therefore Springer does not provide a proper basis for a rejection of any claims under 35 USC 102(a) or 102(e), and the rejection should be withdrawn.



**103(a) rejection of claims 1, 2, 5, 7, 8, 11, 12, 13 and 15 as being unpatentable over Stuart (US 4,790,133) in view of either Davies et al. (US 3,720,060) or Udall et al. (US 5,409,184).**

The Examiner alleges, on pages 3-4 of the Office Action, that Stuart teaches *"an intermediate portion and a gas generator portion which appear integrally joined together"* to provide *"what appears to be a one-piece casing"* but *"it is not clear whether 50 is welded or otherwise rigidly fixed to both 54 and 14 to make an integrated single piece."*

As noted above, the Examiner's allegations of what is taught by Stuart is based on the figures alone. Stuart speaks nothing of welding, rigid fixing, of integral joining – these are the Examiner's interpretations alone. The question to be answered is whether the Examiner has, on balance, provided sufficient evidence to support his allegations.

With regard to rejections under 35 U.S.C. 103, the examiner must provide evidence which as a whole shows that the legal determination sought to be proved (i.e., the reference teachings establish a prima facie case of obviousness) is more probable than not." M.P.E.P. 2142 (Emphasis added).

If taken at face value, Stuart's figures disclose a solid fan & intermediate cases mounted to a solid compressor and turbine case. The device would be very heavy indeed. The skilled reader would recognize that no turbofan engine would ever be designed as depicted, and that Stuart does not contribute anything to the art of turbofan case design.

As noted above, the depiction of the case in Figure 1 of Stuart does not teach a single piece fan case – see, for example US Patent Nos. 5,357,744 and 5,899,660 referred to above – it is clear that the skilled reader would not attribute the teachings to the prior art which the Examiner suggests.

Absent specific teachings in Stuart supporting the Examiner's interpretation of Stuart, Applicant respectfully submits that threshold required to be met to support a rejection under 103(a) has not been met, and therefore the rejection is improper and should be withdrawn.

**103(a) rejection of claims 1, 2, 5-7, 11-13 and 15 as being unpatentable over Udall et al. (US 5,409,184) in view of Stuart (US 4,790,133).**

The Examiner alleges, on pages 5 of the Office Action, that Udall et al. teach an intermediate portion and a gas generator portion which *"appear integrally joined together"* to provide *"what appears to be a one-piece casing"* but *"Udall does not specifically teach the portions of the core engine shroud 14 (compressor, combustor/gas generator) are integrally joined. However, integral joining is well known in the art as suggested by Stuart who shows that an integral core engine shroud 14 for the compressor and combustor/gas generator."*

As mentioned above, Stuart does not provide sound grounds for the allegation that integral joining of gas turbine cases is well known in the art.

With regard to Udall et al., the core casing is not fully depicted, nor is the core casing or fan casing discussed. There is no support for the allegation that the core casing or fan casing are themselves integral or one-piece structures, regardless of any integral connection to the frame. Furthermore, although the members 36 and 37 are "integrally formed with, or secured to" the respective casings, a few lines earlier the spokes 34 are taught as being only "secured at their radially inner ends" to member 36 and "connect[ed at their] radially outer ends" to members 37 (column 3, lines 47-53), clearly omitting integration as an option in both cases. Thus, by comparison, Udall teaches that spokes 34 cannot be integrally provided with members 36 and 37, and thus cannot teach an integrally joined fan and core casings, as alleged.

Therefore, the alleged combination does not teach the invention, and the rejection is therefore improper and should be withdrawn.

**103(a) rejection of claims 3, 4, 9, 10 and 14 as being unpatentable over either Udall et al. (US 5,409,184) in view of Stuart (US 4,790,133) or Stuart (US 4,790,133) in view of Davies et al. (US 3,720,060) or Springer (US 6,532,731), and further in view of Allen (US 6,109,022).**

In view of the Applicant's comments above, Applicant submits that, irrespective of what Allen may or may not teach, claims 3, 4, 9, 10 and 14 are

allowable as depending from an allowable base claim. The rejections should therefore be withdrawn.

**Conclusion**

In view of the above mentioned deficiencies in the rejections of the present claims, Applicant respectfully request to appeal the rejections, and request that the rejections be withdrawn. It appears clear to Appellant that independent claims 1, 7 and 12 are allowable, while the remaining claims are dependent directly or indirectly from independent claims 1, 7 and 12, whereby claims 1 to 15 should be allowed.

8. CLAIMS APPENDIX

An appendix containing a copy of the claims involved in the appeal can be found enclosed herewith.

9. EVIDENCE APPENDIX

None

10. RELATED PROCEEDINGS APPENDIX

None

11. OTHER MATERIAL CONSIDERED RELEVANT BY APPELLANT

Appendix B contains Appellant Supplemental IDS and Statement of Relevancy filed on April 12, 2006.

12. APPEAL BRIEF FEE

The Commissioner is hereby authorized to charge the \$500.00 Fee under 37 C.F.R. 41.20 (b) (2) and/or any other fee which may be required to Deposit Account No. 195113.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'S. Clark', is written over a horizontal line.

Sébastien Clark, Registration No. 56,651

**CUSTOMER NUMBER 32292**

Agent of Record,  
Agent of Record  
OGILVY RENAULT LLP  
L981 McGill College Ave.  
Montreal, Quebec, Canada H3A 2Y3  
Tel.: (514) 847-4259  
Fax: (514) 288-8389

**APPENDIX A- PENDING CLAIMS**

1. A casing for a turbofan engine, substantially encasing at least a fan assembly, a compressor assembly, a combustor assembly and a turbine assembly, the casing comprising:  
  
a fan case portion;  
  
an intermediate case portion; and  
  
a gas generator case portion,  
  
wherein the fan case portion, the intermediate case portion and the gas generator case portion are integrally joined together, thereby forming an integral casing.
2. The casing as claimed in claim 1 wherein the fan case portion, the intermediate case portion and the gas generator case portion are made of the same material.
3. The casing as claimed in claim 1 wherein the intermediate case portion further comprises an integral compressor shroud portion and an integral bearing mount portion.
4. The casing as claimed in claim 3 wherein the bearing mount portion is configured to provide integral damping to a shaft bearing.
5. The casing as claimed in claim 1 wherein the individual fan case portion, the intermediate case portion and the gas generator case portion are fabricated individually and welded together.
6. The casing as claimed in claim 1 wherein the fan case portion, the intermediate case portion and the gas generator case portion are joined together by flangeless connections.

7. A bypass turbofan engine comprising:

at least a fan, a compressor, and a gas generator disposed in flow series within the engine, and a bypass airflow defined around at least the compressor and gas generator; and

a one-piece casing substantially encasing the fan, compressor and gas generator.

8. A turbofan engine as claimed in claim 7 wherein the casing further comprises an integral compressor shroud encircling blade tips of the compressor.

9. A turbofan engine as claimed in claim 8 wherein the casing further comprises an integral bearing seat for directly mounting a compressor shaft bearing to the casing.

10. A turbofan engine as claimed in claim 9 wherein bearing seat is configured to provide integral damping to the compressor shaft bearing.

11. The turbofan engine as claimed in claim 7 wherein the casing at least partially defines a by-pass air flow passage within the engine.

12. A turbofan engine for an aircraft comprising:

a rotating assembly including a propulsive fan portion, a compressor portion, and a gas generator portion, the rotating assembly having an axial length; and

a generally tubular casing assembly enveloping the rotating assembly substantially along the axial length thereof and thereby defining a main flow path through the engine, wherein the casing assembly is an integrated single piece.

13. The turbofan engine for aircraft as claimed in claim 12 wherein the casing assembly further comprises an integral shroud section encircling a plurality of compressor blade tips of the compressor portion.

14. The turbofan engine for aircraft as claimed in claim 12 wherein the casing assembly further comprises an integral bearing seat for operatively supporting a compressor shaft of the compressor portion.

15. The turbofan engine for aircraft as claimed in claim 12 wherein the casing defines at least a portion of a by-pass air duct of the engine.

**Appendix B – Supplemental IDS filed on April 12, 2006**



Statement of Relevancy

**US6910851** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted.

**US6371721** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US6305899** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US5899660** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US5357744** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 4,790,133 (Stuart).

**US5299910** - Figure 1 appears to show a single-piece engine case, however in Figure 5 a portion of a multi-piece case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 4,790,133 (Stuart).

**US4716721** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US4502276** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US20050058541** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted.

US2404334 - An early example of a turbojet engine, in which a segmented case is disclosed.

**The Modern Gas Turbine (Rolls-Royce, 2000)** - A turbofan engine is shown on page 4 which appears to show a single-piece engine case, however on pages 7-11, a multi-piece bolted engine case assembly of the engine is disclosed in detail. The brochure is from the same patentee as US Patent No. 5,409,184 (Udall).

Respectfully submitted,

Date: April 12, 2006



Sébastien Clark, Registration No. 56,651  
OGILVY RENAULT LLP  
1981 McGill College Avenue #1600  
Montreal, Quebec, Canada H3A 2Y3  
Tel.: (514) 845-7126

Encls. - Form PTO/SB/08A/B + copy of 1 non-patent reference

Statement of Relevancy

**US6910851** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted.

**US6371721** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US6305899** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US5899660** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US5357744** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 4,790,133 (Stuart).

**US5299910** - Figure 1 appears to show a single-piece engine case, however in Figure 5 a portion of a multi-piece case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 4,790,133 (Stuart).

**US4716721** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

**US4502276** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted. The patentee is the same patentee as US Patent No. 5,409,184 (Udall).

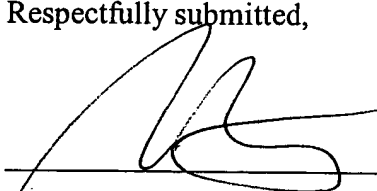
**US20050058541** - Figure 1 appears to show a single-piece engine case, however in Figure 2 a multi-piece bolted case assembly is clearly depicted.

US2404334 - An early example of a turbojet engine, in which a segmented case is disclosed.

**The Modern Gas Turbine (Rolls-Royce, 2000)** - A turbofan engine is shown on page 4 which appears to show a single-piece engine case, however on pages 7-11, a multi-piece bolted engine case assembly of the engine is disclosed in detail. The brochure is from the same patentee as US Patent No. 5,409,184 (Udall).

Respectfully submitted,

Date: April 12, 2006



Sébastien Clark, Registration No. 56,651  
OGILVY RENAULT LLP  
1981 McGill College Avenue #1600  
Montreal, Quebec, Canada H3A 2Y3  
Tel.: (514) 845-7126

Encls. - Form PTO/SB/08A/B + copy of 1 non-patent reference